SENSORY ANALYSIS OF MUFFINS WITH GRAPE POMACE FLOUR

Fisnik Nuhi, Sumeja Idrizi – Students
Faculty of Technological Sciences,
"Mother Teresa" University, Republic of Macedonia
Erasmus students in Branch Ragrad
E-mail: fisnik.nuhi@students.unt.edu.mk; sumeja.idrizi@students.unt.edu.mk

Assistant Gjore Nakov, MSc
Department of Biotechnology and Food Technology,
University of Ruse "Angel Kanchev" – Branch Razgrad
Phone: +359 88 295 6044
E-mail: gnakov@uni-ruse.bg

Abstract: *The waste of the food industry is rich in biologically active substances. By introducing this type of waste in the production of new food products, so-called "functional foods" can be created. The aim of this work was to produce muffins with different amounts of grape pomace (4% and 8%) and to determine their sensory characteristics. It is noted that muffins with grape pomace can "compete" with the traditional ones, and by some parameters they overcome them.*

Keywords: *sensory analysis, muffins, grape pomace.*

INTRODUCTION

In the modern world on a national, European and global level, waste management and sustainable development is largely disscused. According to EUROSTAT data, more than 2.5 million tonnes of waste is produced in the EU (of which about 10% represents waste of the manufacturing industry), only 10% is regenerated and the rest is burnt. The food industry is generally one of the largest sectors, which is a great importance for every economy. This sector is in constant growth that is primarily caused by the increase in the number of population, changes in the food habits, etc. During the food production there is a significant quantity of the by-products (in some cases over 80%) which are a problem for the industry and are most often used for animal feeding. (Šubarić D., 2017).

The large amounts of organic waste remains after production of wine in the wineries. Grape pomace is the solid waste that accounts for about 20-30% of the total weight of the grapes. Around 9 million tonnes of grape pomace is generated every year, consisting of seeds, leather and pulp and sometimes from stems of grapes. Grape pomace is commonly used as fodder or as compost. The chemical composition of grape pomace depends on the type of the grapes, the geographical origin, and the agro-technical conditions during the cultivation of the grapes and during the wine production. Grape seeds have a complex chemical composition and contain about 40% fiber, 16% fat, 11% protein and 7% complex polyphenol compounds, as well as other substances such as sugars, minerals and non-polyphenol antioxidants (β-caroten) (Teixeira et al., 2014). The grape skin participates with the highest percentage in grape pomace (Amendola, De Faveri & Spingo, 2010). The stem makes up the sceleton of the grapes, and stem content in the processed grapes is in the range of 2-8% (Gonzales-Centeno et al., 2010). The potential use of grape pomace as an additive in food production is proposed by Lambert, Rod, Dobbin & Hosseinian (2017). The aim of this paper was to determine the sensory characteristics of muffins enriched with 4 and 8% grape pomace.

EXPOSITION

Materials:

White wheat flour (Type - 500), grape pomace from black grapes (variety- black Muscat), other raw materials (sugar, eggs, baking powder, vegetable oil and milk) were purchased from the local shops in Razgrad, Republic of Bulgaria.

Methods:

Production of muffins

The raw materials are dosed according to the scheme for the production of muffins represented in Figure 1. It was produced muffins with 0%, 4% and 8% grape pomace.

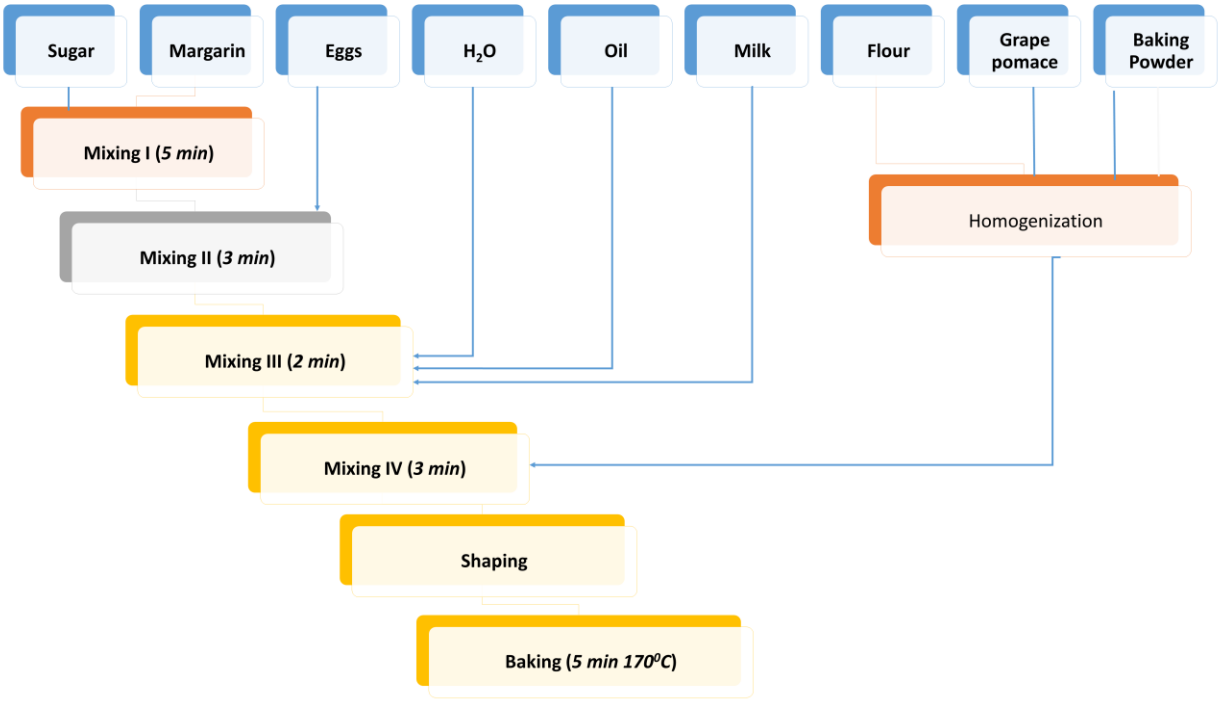

Fig. 1. Scheme for production of muffins with grape pomace

Sensory analysis

Sensory analysis was performed according to the method presented by Nakov et al., 2017. Thirty previously trained persons participated in the sensory analysis of the produced muffins. The muffins were evaluated according to 5 parameters (Table 1.): appearance, internal structure, texture, odor, taste and aroma. For each parameter muffins are rated with 1 – "I do not like at all" and 5 – "I like it so much".

Table 1. Sensory analysis parameters

Sensory characteristics	1 is extreme dislike and 5 is extreme like
Apparance	
Internal structure	
Texture	
Odor	
Taste	
Aroma	

Statistical analysis

Analysis of variance (ANOVA) and Fisher`s Least Significant Difference test (LSD) at $p<0.05$ were performed with the softwares XLSTAT 2017 and Microsoft Office Excel 2013.

RESULTS AND DISCUTION

Sensory analysis is a scientific discipline which analyzes the composition of foods (appearance, smell, texture and taste) by evaluating human reactions (Nakov et al., 2017; Food – a fact of life, 2010). Sensory properties are the first, and often the only parameters based on which most consumers assess the quality of food. The sensory or organoleptic properties of food as a quality aspect are associated with a sense of pleasantness that can be provided by food during consumption, and includes those features that can be perceived with the senses of vision, smell, taste, touch, and even hearing (Koprivnjak, 2014). Figure 2 presents the results of the sensory analysis of muffins with the addition of 0%, 4% and 8% grape pomace.

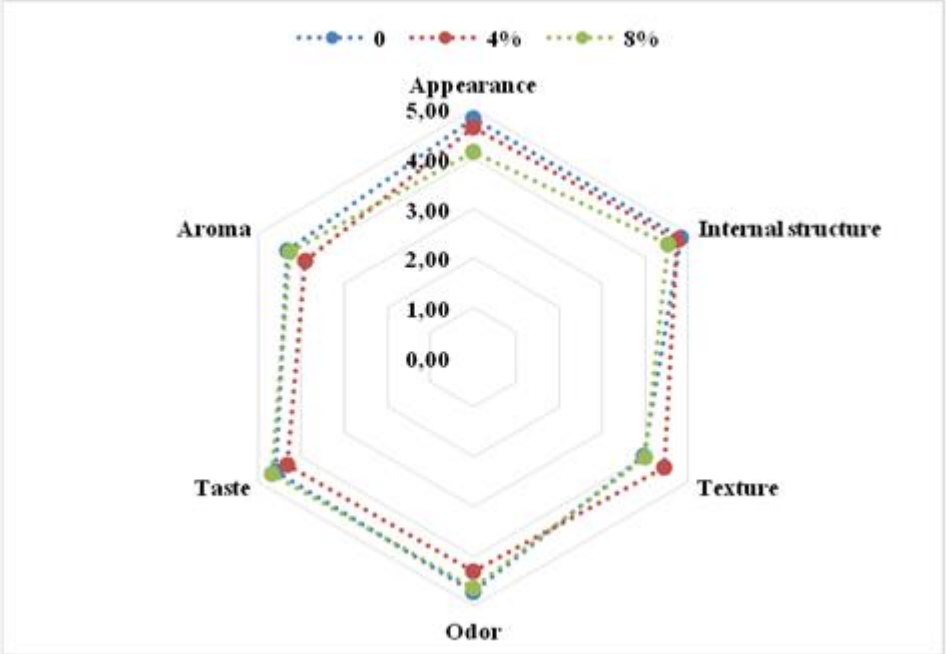

Fig. 2. Results of sensory analysis of muffins with grape pomace

Every trader knows that the outward appearance very often represents a single significant property, according to which a decision will be made whether a product will be bought and consumed or not. The look is an optical property based on the sense of vision, and includes features that can be visually examined (Mandić & Perl, 2006). Figure 2 shows that control muffins (0%) have received 4.82 points appearance, and muffins with the addition of 4% and 8% grape pomace have received 4.64 and 4.14 points, respectively.

The internal structure of control muffins (without added grape pomace) was rated with 4.82 points while the muffins with the addition of 4% and 8% grape pomace has been scored with 4.73 and 4.55, respectively. The most complex characteristic of sensory analysis is the texture/consistency of food products. It represents a combination of physical properties and properties registered with touch senses. The mechanical properties of the texture are determined using five basic characteristics: hardness, cohesiveness, viscosity, elasticity and adhesiveness (Popov-Raljić & Radovanović, 2007). From the sensory analysis, it has been found that muffins with 4% and 8% grape pomace had better grades (4.45 and 4.00, respectively) for texture compared to control muffins (3.95).

The smell/odor is a feeling created during the reconciliation of certain unstable fragrant substances (Terzieva & Obreshkov, 2014). Figure 2 shows that the control muffins (0% grape

pomace) received 4.73 points for this parameter, and muffins with 4% and 8% grape pomace 4.32 and 4.64, respectively. It is noted that increase of grape pomace addition also inreases the scores for muffin odour because of the strong, pleasant and intense smell of grape pomace. Taste (lat. *gustus*) as a food quality property is defined as a set of perceptions derived from the senses that are grouped together at the entrance of the digestive and respiratory tract (Mandić & Perl, 2006). The muffins with the highest grape pomace content (8%) had the highest score for taste (4.68) compared to the muffins with 4% grape pomace –(4.32) and control muffins –(4.59). The aroma of food products is the result of the interaction of a large number of substances that are in close association and play a major role in the formation of one product. The muffins used as a control (without grape pomace) in this test have the highest rates for this parameter (4.32). The muffins with 4% grape pomace have 3.91 points and those with 8% grape pomace 4.23 points from a maximum of 5 points.

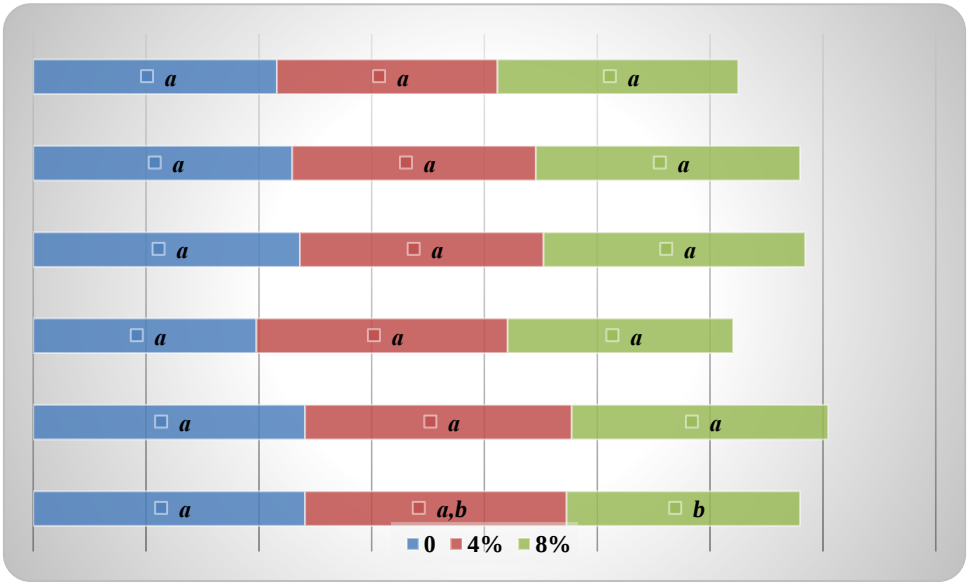

Fig. 3. Statistical analysis of results from sensory analysis of muffins with different amounts of grape pomace

Statistical data processing (Figure 3) made using the XLSTAT 2017 and Microsoft Office Excel 2013 program showed statistically significant differences between the muffins used as control (0% grape pomace) and the muffins with 4% and 8% grape pomace only in the external appearance.

CONCLUSION

It has been established that there is a real possibility for the production of muffins with the addition of different percentages of grape pomace. Grape pomace represents food waste that is generated after the production of wine. Incorporating this type of waste into a food product has been presented in this paper in order to obtain a functional product. Sensory analysis showed that muffins with an added grape pomace can compete with traditional muffins, and even overcome them according to some parameters (texture, odor and taste).

REFERENCES

Amendola, D., De Faveri, D.M. & Spingo, G. (2010). Grape marc phenolics: Extraction kinetics, quality and stability of extracts. Journal of Food Engineering, 97 (3), pp. 384-392.

Food – a fact of life (2010). Sensory evaluation Teachers' guide.

González-Centeno, M.R., Rosselló, C., Simal, S., Garau, M.C., López, F. & Femenia, A. (2010). Physico-chemical properties of cell wall materials obtained from ten grape varieties and

their byproducts: grape pomaces and stems. LWT – Food Science and Technology, 43 (10), pp. 1580-1586.

Koprivnjak, O., (2014). Kvaliteta, sigurnost i konzerviranje hrane. Udžbenik iz kolegija „ Uvod u prehrambene tehnologije“ za studente sanitarnog inžinjerstva, Rijeka.

Lambert, D., Rod, M., Dobbin, C. & Hosseinian, F. (2017). The Market Potential of a Grape Pomace Microemulsion. Journal of Food Research, 6 (2), pp: 65-74.

Mandić, M.L. & Perl, A. (2006). Osnove senzorske procjene hrane. Prehrambeno-tehnološki fakultet Osijek, Osijek.

Nakov, G., Komlenić, K.D., Ivanova, N., Damyanova, S., Godjevargova, T. & Šušak, A. (2017). Sensory analysis of biscuits from einkorn flour, barley flour, einkorn flakes and wheat flour in different proportions and different sugars. Proc. 9th International Congress FLOUR-BREAD 2017 - 11th Croatian Congress of Cereal Technologists 2017. pp. 105-114.

Popov-Raljić, J. & Radovanović, R. (2007). Senzorna analiza u funkciji utvrđivana bezbednosti i kvaliteta prehrambenih proizvoda. “Savremena Poljoprivreda”, Vol. 56 (5):142-149.

Šubarić, D. (2017). Neke mogućnosti iskorištenja nusproizvoda prehrambena industrije. Sveučilište Josipa Jurja Štossmazera u Osijeku, Prehrambeno-tehnološki fakultet, Osijek.

Teixeira, A., Baenas, N., Dominguez-Perles, R., Barros, A., Rosa, E., Moreno, D.A. & Garcia-Viguera, C. (2014). Natural Bioactive Compounds form By-products as Health Promoters: A Review. International Journal of Molecular Science, Int J Mol Sci., 15(9): 15638–15678.

Terzieva, V. & Obreshkov, I. (2014). Senzoren analiz na hrani i napitki. Akademichno izdatelstvo na UHT – Plovdiv.